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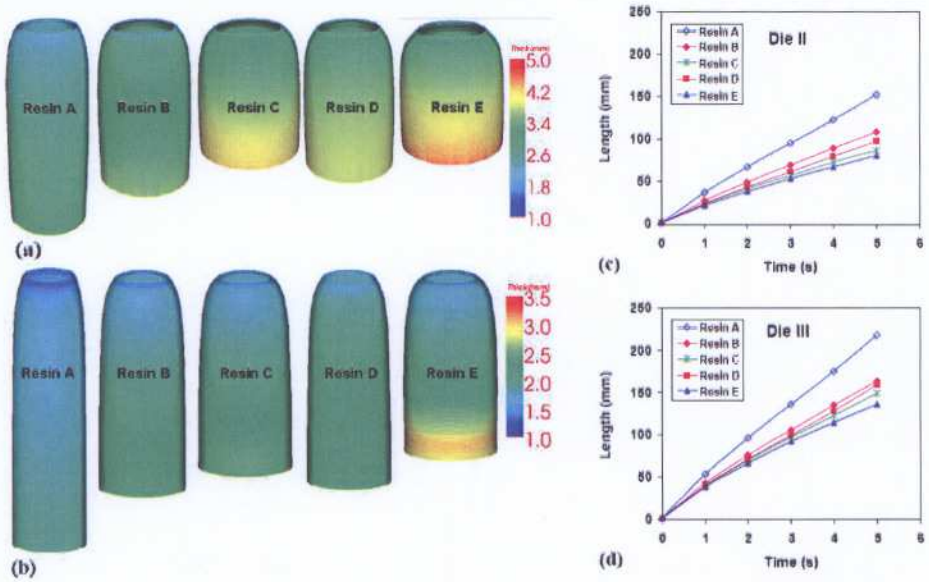
ABSTRACT

The most critical stage in the extrusion blow molding process is the parison formation, as the dimensions of the blow-molded part are directly related to the parison dimensions. The swelling due to stress relaxation and sagging due to gravity are strongly influenced by the resin characteristics, die geometry, and operating conditions. These factors significantly affect the parison dimensions. This could lead to a considerable amount of time and cost through trial and error experiments to get the desired parison dimensions based upon variations in the resin characteristics, die geometry, and operating conditions. The availability of a modeling technique ensures a more accurate prediction of the entire blow molding process, as the proper prediction of the parison formation is the input for the remaining process phases. This study considers both the simulated and the experimental effects of various high density polyethylene (HDPE) resin grades on parison dimensions. The resins were tested using three different sets of die geometries and operating conditions. The target parison length was achieved by adjusting the extrusion time for a preset die gap opening. The finite element software BlowParison© was used to predict the parison formation, taking into account the swell and sag. Good agreements were found between the predicted parison dimensions and the experimental data.



(a & b) Simulated parison swell for the five resins after 5 s of extrusion using two different die geometries; (c & d) predicted parison length evolutions as function of time using these dies (gap = 1 mm, flow rate = 10 g/s).